METEOROLOGICAL OBSERVATIONS IN THE PYRENEES

M. DURUOF, the French aëronaut, has just completed a series of three ascents executed from Pau, for the purpose of studying the state of the atmosphere during the recent cold season. Thrice M. Duruof started with a north wind at the surface of the earth, and thrice he was able to find an upper current blowing from the south. The last time he started at 1.30 P.M., travelled upward until 2.30 P.M., moving southwards, when having reached a higher level he was carried northwards. He landed safely at 4 P.M. in the department of Gers.

He found in his last trip that the wind was veering regularly with increasing altitude, and was steady at certain levels, so that it was possible to go in any direction by keeping the proper altitude for a sufficient length of time. All his changes of direction were traced on an Ordnance Survey map. His readings and observations will be sent to the Academy of Sciences for further discussion.

It was observed during the recent cold period that the barometer was low with a northern wind, which is unusual. The three ascents of Duruof may be regarded as affording an explanation of the fact, if we suppose the southern current to have been general at an altitude of 4,000 to 9,000 feet above the earth.

The superior current on the 4th of March was carrying immense quantities of snow at a temperature of 0° C. The snow rapidly melted in its descent, as the air was mild below. It is probable that this snow was caused by the influence of the Pyrenean range, which is very cold. I observed at Paris an effect which can be ascribed to similar causes, from hilly parts of our geological basin situated in the south. On that very day the sky was covered in the south and blue in the north, where immense plains extend to any distance.

At all events the southern aërial stream which carried the balloon northwards was very thick. M. Duruof was unable to find its upper surface, although he reached the level of 11,000 feet.

Other ascents will be made by the same enterprising aëronaut, whose special attention has been so long devoted to the utilisation of various currents according to altitude. W. DE FONVIELLE

SCIENCE AT THE NEW PARIS OPERA*

II.

ALL branches of Physics are represented in the New Opera; Heat, Light, Optics, Electricity, Acoustics play their different parts. So far as acoustic instruments are concerned, we may refer to an organ constructed by M. Cavaillé-Coll, and formed of eighteen registers, distributed over two key-boards, and a complete foot-board. This organ is worked by four pedals, vibrating the air contained in 1,032 pipes, of which some are more than five metres in height, and above '30 metre in diameter, But it is the electric light which has most interest for us.

After giving a brief account of the invention and history of the voltaic pile, M. Tissandier proceeds to describe the battery connected with the New Opera, which has been organised by M. Duboscq.

The electric light may be thrown upon the magnificent stage by means of a Bunsen battery of 360 elements, which is established in a room on the ground-floor, the length of which is not less than seven metres. M. Duboscq has here arranged six tables of 2·75 metres long by ·75 metre broad, which each support a Bunsen battery of sixty elements (Fig. 5). This battery is placed upon the table which is made of very thick unpolished glass that cannot be injured by the acids. The elements are arranged in four rows of fifteen each. The table is provided underneath with a board which supports a large rectangular basin, in which the plates are placed after they have been used. The jars of the battery, filled with nitric acid, are, after being used, placed in a tub containing the acid and closed with a wooden lid.

In order to work a battery of such power under favourable conditions, M. Duboscq has had to make special arrangements for the preparation of the sulphuric acid liquid as well as for the zinc amalgams necessary to put the system of batteries in action.

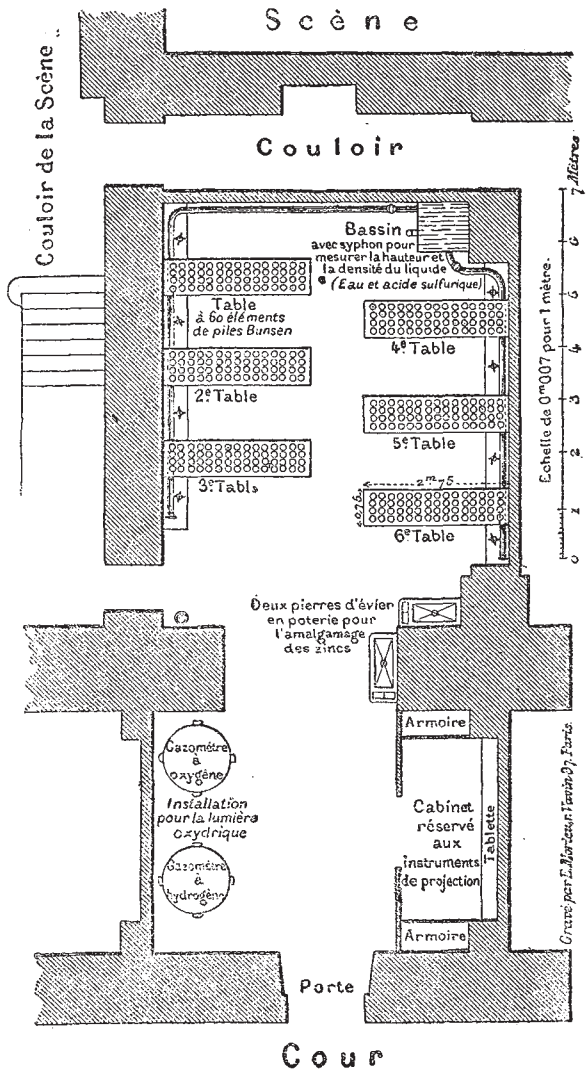

FIG. 5.—Plan of the Electric Room at the New Opera.

At the right corner of the electric room is a large reservoir, of the capacity of about one cubic metre, where water mixed with one-tenth of sulphuric acid can be stored. A spigot permits this liquid to run into a vertical siphon formed of a large tube, into which an areometer is plunged to ascertain its quality, and make sure that the preparation has been made in the proper proportions. The reservoir is furnished at its lower part with an earthenware pipe which is conducted along the walls of the room, opposite the six battery tables. Beside each table an earthenware spigot enables the operators to run the liquid into earthenware jugs, from which they fill the battery jars with the liquid.

By an excellent precaution M. Duboscq has obviated

* Continued from p. 351.

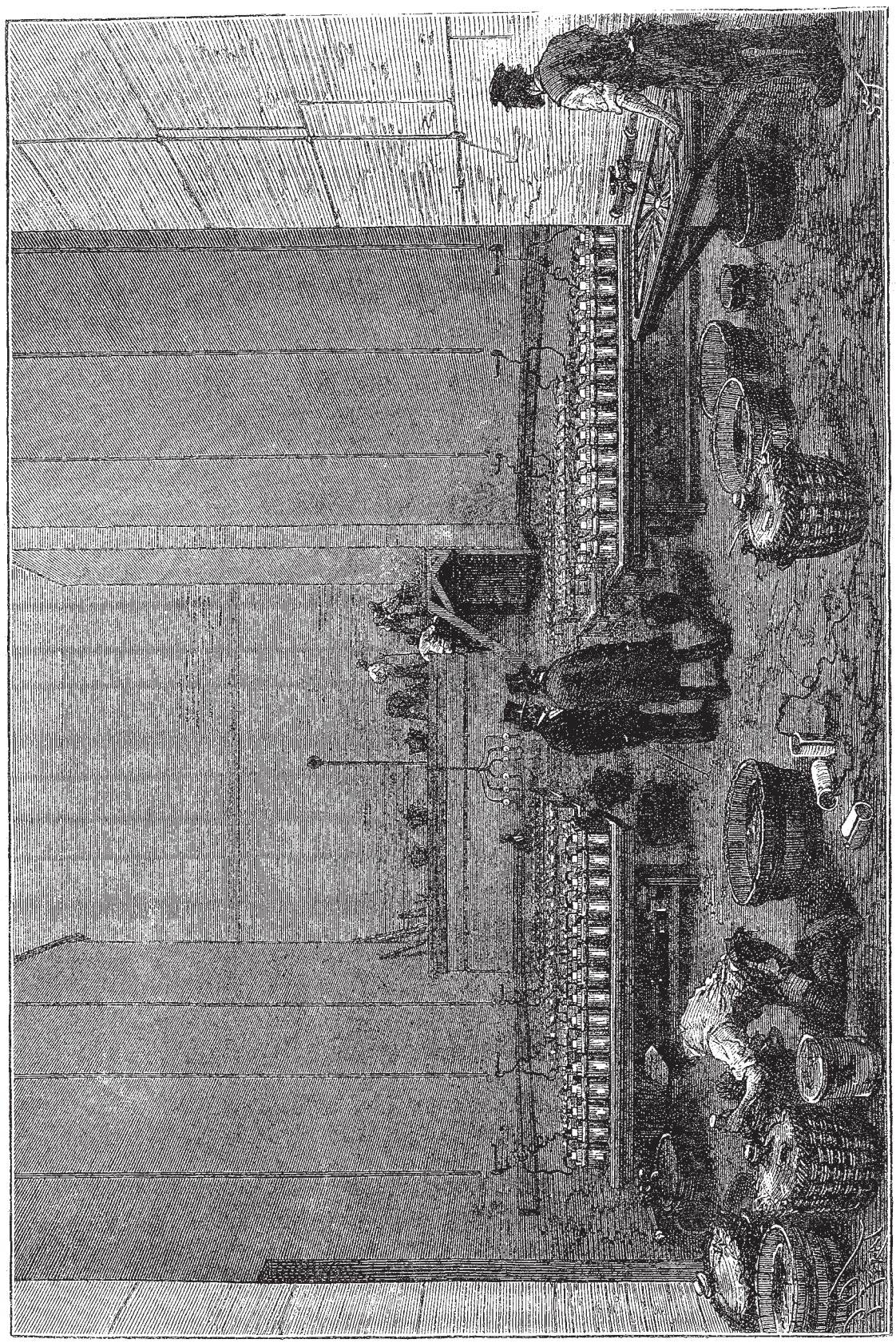

FIG. 6.—View of the Electric Room at the New Opera.

the dangerous action of the nitrous vapours, by placing here and there upon the piles saucers containing ammonia, which condenses them.

Each table, as we have said, forms a battery of sixty elements. The electric wires are conducted along the wall at the bottom of the room, where they traverse six galvanometers (Fig. 6). Each of these galvanometers indicates, by means of the needle with which it is provided, the condition of the battery to which it corresponds. The six isolating wires, after leaving the six galvanometers, pass along the walls to the stage, where the currents which they carry may be utilised either singly or by twos or threes, according to the degree of intensity which it is wished to give to the light. The distance which the current runs from the electric room to the most distant point of the stage is about 122 metres; the total length of all the wires is about 1,200 metres.

M. Duboscq, imitating the systems of telegraphic wires, makes use of the earth as a return current; one of the poles of each battery is in communication with the iron of the building. Without this arrangement it would have been necessary to double the length of the wires.

In most instances M. Duboscq places his electric lamp on one of the wooden galleries which run along the higher regions of the scenery above the stage. It is from this artificial sky that he, a new Phœbus, darts upon the nymphs of the ballet the rays of his electric sun. It is from here, decomposing the light by means of the vapour of water, he throws upon the stage a veritable rainbow, as in *Moses*; again, it is thus that he causes the light from the painted windows to fall upon the flags of the church where Margaret is in the clutches of remorse. Sometimes the electric apparatus is placed on a level with the stage, when it is sought to produce certain special effects, such as that of the fountain of wine in Gounod's opera. The lime-light is also used to produce certain brilliant effects in the New Opera.

It will thus be seen that the electrical arrangements in the New Opera leave little to be desired. There is an electric battery of extraordinary power, which might be profitably used for certain experiments of high interest, requiring an electric power of great intensity. M. Tissandier makes the very happy suggestion that this powerful battery might be utilised for the purpose of scientific research, and we hope that those who have the management of the Opera will take his hint; they ought to remember how much their art owes to the researches of science. He also very appropriately suggests that the Government which has made such a lavish expenditure, forty million francs, on a place of amusement, might also benefit the country even more by doing something to restore to efficiency the buildings in which the work of science is carried on. At all events it will be seen that in this magnificent building Science occupies a place of no mean importance.

NOTES

LETTERS have been received from the Eclipse Expedition from Suez. They had heard from the Viceroy that arrangements had been made to have a vessel awaiting them at Galle.

THE following telegram has been received by the *Times* from its St. Petersburg correspondent, with regard to the Transit of Venus:—"Herr Struve reports that at Hakodaki both interior contacts were observed. At Wakhodka, on the coast of the Pacific east of Vladivostock, only the first interior contact was observed. At Kamen Riboloff, on Lake Hanka, all four contacts were satisfactorily observed, but no heliometric measurements. At Ashooradeh, on the Caspian Sea, some diameters and chords were measured; but the sun was covered by clouds at the moment of contact. No report yet from Pekin." We would also call attention to the account of the French observations in New Caledonia, which we publish this week, and to the interesting letter in yesterday's papers from Capt. Fairfax, of the *Volage*, to the Admiralty, giving some details of the Kerguelen Island parties. The astronomers, he says, are pleased with their success. News has now been received more or less from all the Kerguelen parties; we hope to be able to summarise them next week.

PROF. C. S. LYMAN writes to the *New York Tribune* to say that he observed the planet Venus on the 8th of December, a few hours before its transit began, and found that from the time when it was 1° 50′ distant from the sun's centre, up to the time of its passage across its disc, it was apparently surrounded by a ring of light, which appearance was due to the refraction of the sun's light passing through the planet's atmosphere on its way to the earth. This phenomenon was first observed by Prof. Lyman in 1866, and will again occur in 1882, being repeated, in fact, as often as the planet approaches within the limiting distance above mentioned. When further from the sun than this limit, the circle of light becomes a segment only, whose size diminishes as the planet recedes from the sun.

MR. SLATER, one of the naturalists sent out by the Royal Society with the Transit of Venus Expedition to Rodriguez, is now on his way home. Dr. Balfour, who, after his special work, has devoted a month to the Island of Bourbon, is expected to arrive in England at the end of the present month. The collections made have been embarked, and there is reason to hope that in the course of a few weeks we shall be in possession of a complete report of all that has been accomplished by the three young men appointed to explore the singular island Rodriguez. An instalment of their results has already appeared in the Proceedings of the Royal Society. In like manner, Mr. Gulliver is devoting a month to marine zoology at Zanzibar.

THE list of candidates for the Fellowship of the Royal Society is closed for the present session. The number up is fifty-four.

WE hope that advantage will be taken of the *conversazione* of the Royal Society which is to be held on the 7th April, to exhibit the improvements effected in philosophical apparatus during the past year. It has happened more than once that an important improvement has been shown for the first time at the Royal Society, and we shall be glad if the practice can be continued. The rapidity with which instruments become obsolete in these days is perhaps the most remarkable evidence of the advance of science.

THE large and influential deputation from University College which waited upon the Duke of Richmond and Viscount Sandon on Tuesday received what we think may be regarded as on the whole a satisfactory reply. The deputation showed that the means and buildings and apparatus at the command of the College are totally inadequate to the present advanced position of science and to the efficient discharge of the work which the much underpaid professors have to perform. The Duke of Richmond's reply shows, we think, that the Government are really anxious to help the cause of science and of education as far as the means at their command will enable them. He rightly said that the movement which caused the deputation to wait upon him and his colleague is a legitimate one. "I think," he said, "it would be advantageous to us in considering this question if the Council of the College could see their way to lay before us some estimate of the sum of money that they would seek from the Government, and the mode in which they would propose to spend the money if a sum were granted." This seems to us quite reasonable, and augurs well for the cause of those institutions which can really prove that they deserve to be helped.